

Electrofishing Facts Sheet

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The Tidal Bass Survey team uses electrofishing to survey populations of largemouth bass in tributaries and streams of the Chesapeake Bay watershed. The team has refined their techniques so that very little mortality is observed. All fish are maintained in well-aerated live wells before being returned to the site of their capture. Returning the black bass to their site of capture is essential for the continued success of the monitoring program and protecting the fishery.

WHAT IS ELECTROFISHING?

Scientists use electrofishing to survey fishes and monitor the size of populations and determine the species in a community. Whether using a boat or a backpack electroshocker, the basic principle involves generating an electrical field in the water to stun fish. When fish are stunned, they often times float near the surface of the water and can be removed from the electrical field.

WHY DO SCIENTISTS USE ELECTROFISHING?

Some scientists monitor the status of populations, especially endangered or threatened ones, or ones that are impacted by anglers or hunters. Scientists working with fish and other aquatic organisms have many different tools for determining the status of a population. Electrofishing from a boat is a powerful tool that is used by the Tidal Bass Survey team to survey tidal habitats with silty bottoms that are not waded easily. Electrofishing may also be less harmful to individuals than some other methods, such as gill netting.

HOW DO FISH GET STUNNED?

When a fish swims into a weak electrical field, it may not be affected at all. There is a threshold of electrical charge that must be emitted into the water in order to affect the fish.

When the electrical charge in the water is sufficient to allow transport of the charge across the nerve cells in the body, then the fish's muscles will undergo involuntary contraction. The contractions will lead to increased exercise of the muscle and a build up of lactate in the blood stream.

This process is very similar to what happens to the muscles of a runner or a swimmer who exerts a lot of exercise. The runner or swimmer may eventually get a cramp in the muscle and cannot move it effectively.

When the fish cramps up, it floats to the surface and can be removed from the electrical field. The process to stun a fish is usually 5 – 10 seconds.

Once the fish is removed from the electric field, the Tidal Bass Survey team places the fish in a live well with good aeration. The aeration and cool temperatures are essential in the live well because the fish has an oxygen debt that needs to be paid. Like a runner or swimmer, the lactate in the blood stream and cramping must be treated with rest and good oxygen supply. While this period of recovery may take a short time in humans, the recovery time for fish is generally a minimum of 4 hours and can range up to 12 hours.

ARE YOU STUNNING ALL THE FISH?

Electrofishing is a widespread tool used for surveying black bass because black bass are generally easily stunned by the electric field. When stunned, all black bass are removed from the water. However, not all black bass are likely stunned by the electrofish boat. The electric field quickly weakens with distance from the boat and with depth, so many fish in the area are never affected. Some fish that have been stunned may even build up a tolerance for the electric field. Many

species also have evolutionary adaptations that help them avoid the boat, such as a keen lateral sensory system and eyesight. The black bass may be able to see the boat coming and swim out of the way of the electrical field. Many other species of fish, such as common carp or longnose gar, have especially thick scales that protect them from the electrical fields. Small fish, such as many minnows and killifishes, have such a small body area that the electrical field doesn't affect them.

WHAT IS THE RECOVERY TIME?

Generally, fish recover almost immediately after they are stunned by an electrofisher. They become oriented in the upright position and begin swimming normally within 1 – 2 minutes. To fully recover from the electrofishing, it can take 4 – 12 hours, which depends on the amount of lactate in the blood (or the level of stress the fish experiences) and habitat conditions. It may take also longer for the fish to recover during late summer when dissolved oxygen in the water is low.

DO THE FISH DIE BECAUSE OF ELECTROFISHING?

Whether the fish dies or not depends on the person generating the electrical field and the handling techniques that follow. Most fish live through the experience, but delayed mortality following these surveys is not well-studied.

Fish may immediately die if they are shocked too intensively. This is clearly evident because some of the skin tissue begins to turn black. This type of fatality is one of the easiest to avoid because it is easy to detect and easy to correct.

Fish may experience some delayed mortality because of lactic acidosis, which is the build up and persistence of lactate in the blood stream. If the lactate is not removed by sufficient respiration of oxygen, or if the fish cannot adapt to high levels of lactate, then it will die.